

DIGITALLY CONTROLLED OPTICAL FIBER DELAY LINE

ABSTRACT OF THE DISCLOSURE

5 An optical fiber delay line includes: multiple differential delay lines; and multiple switchers connecting the differential delay lines in pairs. Using, for example, $N+1$ differential delay lines numbered by k from 0 to N , the k -th differential delay line delays an input optical signal by an amount of time $(t_A^k - t_B^k) = 2^k \tau$, so that the electronically controlled switchers allow digitally

10 controlling the delay over a range from 0 to $(2^{N+1} - 1)\tau$ with a time resolution of τ . The delay line can also be used simultaneously as a phase modulator, enabling a system of synchronization that can be realized entirely electronically and may be very useful in the case of large fiber arrays comprising a number of fiber modules such as beam splitters, fiber amplifiers, connectors, and collimators.

15 The delay line can also be used as a commutator, for controlled switching of optical signals between channels.